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The Construction of Web Navigation Model in Online Automated Universities' Students Matching System (OAUSMS)

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Abstract: Navigational contexts are defined and access structures are added in this stage as a finalized form of web navigation model. As a result, this research is targeted to eliminate user frustration as a cause of 'lost in hyperspace'. Online Automated Universities' Students Matching System (OAUSMS) is an existing web-based system that focused on the implementation of data warehousing as the main features of system's development. The development of this system was more to technology oriented without conducting any formal navigational approach. The navigation model is built in two stages. The first one develops a model of rough navigation structure based on navigational classes and links which is called navigational class model. The second one refines this model on describing how objects can be grouped to optimize navigation and collaborate to fulfill the navigation.

Key words: OAUSMS; web navigation model; hypermedia design model (HDM); navigational class model; hyperspace

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1. INTRODUCTION

Good web applications should provide easy navigational access to large information resources, preventing users from being lost in the cyberspace and providing consistent navigation operations even when other kind of transactional behavior involved. According to (Koch et al, 2000), the quality of a web application depends not only on the richness of contents and high-quality graphic design, but also on a well-structured navigation.

Unfortunately, according to (Rossi et al, 2000) the state-of-art conceptual modeling approaches usually neglect navigation modeling as they do not provide useful abstractions capable of easing task of specifying applications that embody the hypertext metaphor. Besides, navigation problems have been largely discussed in hypertext literature (such as Nielson, 1990).

Online Automated Universities' Students Matching System (OAUSMS) is an existing system but the development of this system was focused on technology-based and not concerning on the navigational aspect by the previous researcher. In this research all the functionalities of the system are adopted and systematic and disciplined approaches are devised in order to overcome the complexity and assortment of the system and achieve overall product quality within specific time and budget limits. One such approach is the use of systematic design method to support the navigation design process.

Online-Automated Universities' Students Matching System has been developed by (Aboamama, 2003). This system developed for foreign students who intend to pursue their higher education in Malaysia. It guides those students to find the university that matches to their academic profile. Otherwise, sign up facility is provided to become a registered user which than allowed to search for a local university based on the fee's structure and their profile including the CGPA and the major they graduated.

This system focused on the implementation of data warehousing as the main features of system's development. Different databases are used to retrieve the data and view it to the users. The databases used are MS-Access, MS-SQL Server and Oracle and Microsoft Active Server Page (ASP) as the engine. The designs of user interfaces were on Macromedia DreamWeaver and Microsoft FrontPage tools. In addition, this system provides a unique feature to their users, which they can save the search results as their favorites. They also are allowed to modify their own favorites.

According to (Aboamama, 2003), the target users of the system could be categorized into three, universities who are responsible to maintain their profile, students who are the World Wide User and administrator who are responsible to maintain the user account the functionality of the system are:

He also identified the functionalities of the system that universities can add their new courses, programs and modify the existing information/profile, universities' announced the changes/new implementation in their admission procedure to the students and provide id for logging the system.

Besides he found out user can view the information and details, student is allowed to read and send messages to those who are online in order to share the information and details, student can modify their profile and search based on several queries, which are profile, result, major and fee.

He also highlighted My Favorites provided, which user can save search results and they allow adding/deleting the favorite's record, sign up for new user or university provided upon authentication and News displayed on the main page for notifying whether the user is registered or not.

Furthermore, (Aboamama, 2003) mentioned that this system overcomes the problem faced by the students, who normally use search engines like Google or Alta Vista. It is a universal system for the World Wide Web (WWW) user which wants to get the universities information and the procedures for getting admitted. Beside that, this system maintains all the universities information by using the data warehousing technique. It connects to different databases of the universities for retrieving the data.

Thus, this system shall be reengineered in order to construct a better navigation design where bottom-up process of this system shall be applied in this research.

2. OBJECTIVES

This research was conducted based on awareness that many hypermedia applications are implemented without any formal design approaches and constructed mainly in ad hoc approach. There is no rigorous, systematic approach, and most current web application development and management practices rely on the knowledge and experience of individual developers.

In this research, researcher has constructed a web navigation model for Online-Automated Universities' Students Matching System based on hypermedia design model proposed by Baumeister et al, 1999 which use UML diagrams and notations for modeling techniques and graphical representations.

3. METHODOLOGY

The construction of web navigation model used hypermedia design methodology by (Baumeister et al, 1999) for OAUSMS that comprises of *requirement analysis*, *conceptual design*, *navigation design* and *presentation design* activities. The selection result was based on determination of it's advantages compared to other methodologies such as it is an object oriented approach and it allows a concise specification of the navigation by introducing the concept of navigational contexts and it includes a step for modeling the user interface. Furthermore, the work of (Baumeister et al, 1999) is a model-based approach whose modeling techniques are UML diagrams and whose graphical representation only uses UML notation.

Requirement analysis and conceptual design have to be determined before navigation design could be performed. Requirement analysis would yield functional and non-functional requirement of the system while conceptual design would focus on all the concepts that are relevant to the application and different users or user groups identified in the requirement analysis workflow.

The navigation design which is a crucial step defines the structure of hypermedia application. A navigational model is built in tow steps. The first one describes the rough navigation structure based on navigational classes and links called *navigational class model*. The second one refines this model describing how objects cam be grouped to optimize navigation and collaborate to fulfill the navigation. Navigational contexts are defined and access structures are added in this step. The result is a production of *navigational structure model*.

Presentation design defines the way in which navigational objects will appear, which interface objects will activate and which interface transformation will take place. However, to be synchronized with the research topic, the finding of this research paper will only yield navigation design model only. Figure 1 depicts the overview activities of hypermedia design methodology by (Baumeister et al, 1999).

4. RESULTS

As mentioned earlier, the navigation model of OAUSMS consists of two models which are navigation class model and navigation structure model. In the process of building navigation class model, the

researcher takes crucial design decisions, such as which view of the conceptual model that is needed for the application and what navigation paths are required to ensure the application's functionality. The decisions of the researcher are based on the conceptual model, use case model and navigation requirements that the application must satisfy. The navigational class model for user role *administrator* is shown in Figure 2.

The navigation structure model describes how the navigation is supported by access elements such as indexes, guide tours, queries and menu. Technically, the navigation paths together with the access elements are presented by a class model in two steps. The first step consists in enhancing the navigation class model by indexes, guided tours and queries. The second one consists in deriving menu directly from the enhanced model. Menus represent possible choices navigation. The result is a UML class diagram built with UML stereotypes, which are defined according to the extension mechanism of the UML. Figure 3 shows user role *administrator* structure model which are also modeled with indexes and queries.

5. CONCLUSION

As summarized the utilization of UML for creating hypermedia design applications is a standard, widely adopted, formally defined language for modeling software-intensive systems. Therefore, there exists strong motivation for using this language in the specification of application models.

Models created with the UML are easy to understand, maintain and extend. A number of case tools are available facilitating the task of creation and maintenance of these models. In addition, these case tools can ensure the consistency of a model. For example, they can enforce an element in one model of an application to be properly associated with a corresponding element in a different model of the same application, according to specific semantics. Thus, adopting UML can benefit the design of web applications in creating consistent and formal models.

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FIGURES

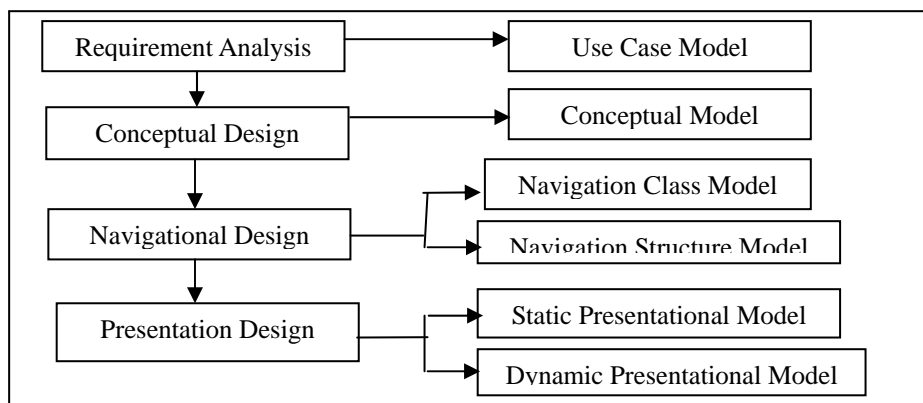


Figure 1: Hypermedia Design Methodology by (Baumeister et al, 1999)

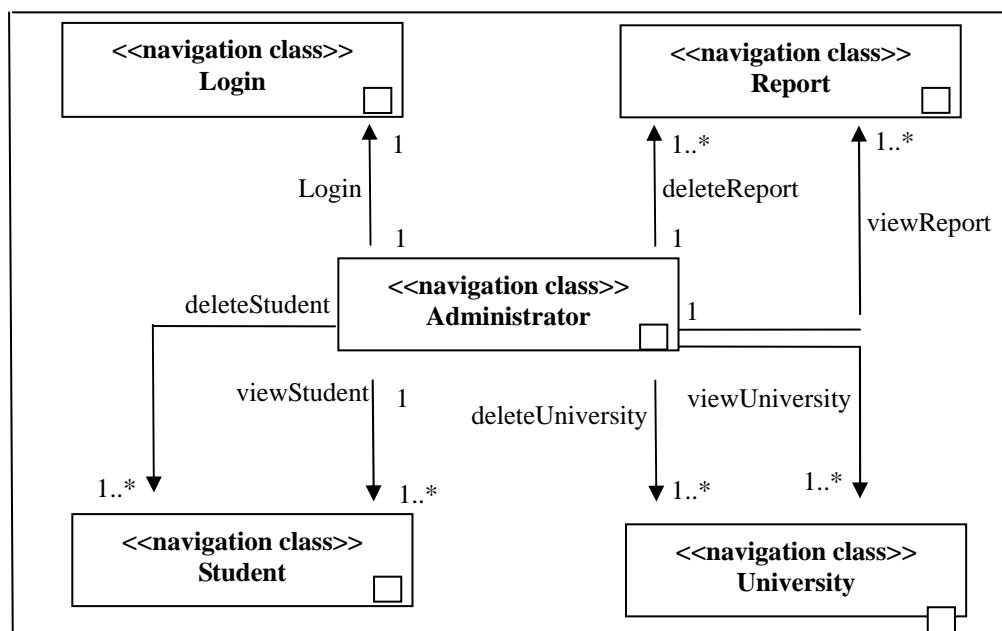


Figure 2: Navigational Class Model of an Administrator

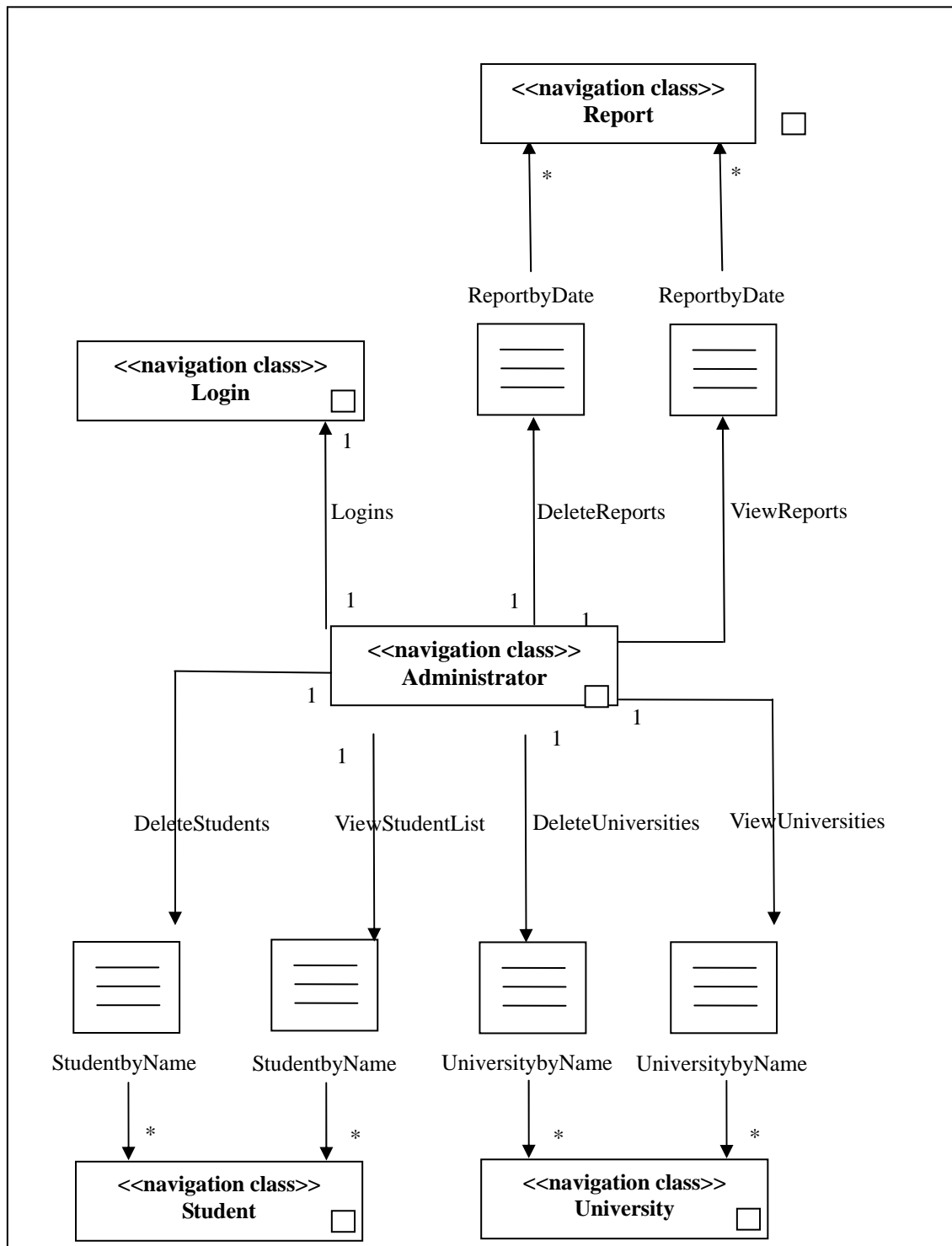


Figure 3: Navigation Structure Model for an Administrator Enhanced with Indexes and Query